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Preserving Historic Bridges

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In February 1991, CRM introduced readers to many of the challenges faced by proponents of bridge preservation (see CRM, Vol. 14, No. 1). That article, "Historic Bridges: Preservation Challenges," offered a general survey of the Federal bridge program and described selected state and local bridge preservation initiatives. This article focuses on successful bridge preservation projects to demonstrate that it is possible to rehabilitate historic bridges for continued use.

Of the estimated 575,000 bridges nationwide, as many as 50,000 may be historically significant. Approximately 1600 bridges are already listed in the National Register of Historic Places, and over 900 additional bridges are eligible for listing. The physical threats to these and other historic bridges— deferred maintenance, harmful deicing salts, and overloading— contribute to their rapid deterioration and fragile position as cultural resources.

Unfortunately, some historically significant bridges could be slated for replacement under the Intermodal Surface Transportation Efficiency Act of 1991. The Act will facilitate the massive rehabilitation of the Nation's aging and deteriorated highway infrastructure throughout the 1990s. However, the Surface Transportation and Uniform Relocation Act of 1987 permits funding bridge rehabilitation and relocation projects, and clearly states that historic bridges should be rehabilitated, reused, and preserved. This older law has not been superseded by the new legislation. Moreover, the new law requires funding for some historic preservation projects.

To date, however, relatively few historic bridges have been rehabilitated for continued use, and other preservation strategies, such as relocation and reuse, have not been aggressively pursued. Bridge preservation projects will only be undertaken within the existing laws if partnerships are forged among planners, preservationists, and engineers. Creative planning, innovative design solutions, modern technologies, and financial savings over new construction, offer the most hope to ensure that historic bridges are preserved.

State highway officials are often reluctant to preserve historic bridges because exemptions are usually required from standards for roadways, hydraulics, traffic capacity, or structural capacity. Many bridges that do not meet these standards are structurally sound, and can remain in service with modifications. Wary of potential liabilities, engineers must be assured that an engineering solution is feasible before choosing to rehabilitate rather than replace a historic bridge. Little, if any, evidence suggests that professionally completed rehabilitations of historic bridges pose a greater liability than non-historic bridges in the national highway system.

There are many challenges for engineers who understand the materials and techniques of historic bridge fabrication and are willing to pursue bridge preservation projects. Engineers must balance preservation principles demanding authenticity of materials and visual characteristics with codes requiring safety, strength and stability. Theoretically, loading capacity increases with greater levels of intervention, but greater intervention decreases the authenticity of materials and mars the appearance of the structural systems. There are no easy answers for engineers. Engineers arrive at the optimum intervention only by combining contemporary and historic building systems and materials to achieve appropriate levels of durability, safety, and authenticity.

Ten successful bridge preservation projects, highlighted in this article, illustrate the potential for preserving historic bridges. They offer evidence that preserving concrete, metal, and stone bridges is financially prudent, technically feasible, and in many situations, the preferred alternative to new construction. To preserve important physical reminders of our engineering and transportation legacy, innovative engineering solutions must be embraced by bridge engineers and transportation officials. And preservationists must insist that the means for bridge preservation be carried out to the fullest extent possible by engineers with proven experience in rehabilitating historic bridges.

Walnut Street Bridge (1891)
Chattanooga, TN

The Walnut Street Bridge was constructed between 1889 and 1891, and spans 2,370'. It contains 39 steel stringer approach spans and 6 through modified Camelback truss river spans, and was designed by Edwin Thacher, a prominent Louisville engineer. Built to connect Chattanooga's growing commercial and residential districts on both sides of the Tennessee River, the bridge replaced cumbersome ferries.

Use of the bridge declined after 1917, when the Market Street Bridge was constructed nearby. After almost 90 years of service, the bridge was closed to all traffic in 1978. Community interest in revitalizing the bridge gained momentum during the late 1980s, and became a reality when the city received a $2 million Federal Highway Demonstration Grant and committed $1.2 million for the project. The bridge was listed in the National Register of Historic Places in 1990.

The bridge's restoration for use as a river park is currently underway following designs by the New Jersey engineering firm, A.G. Lichtenstein, and Associated Architects of Chattanooga. The bridge will be upgraded for pedestrian use by introducing unobtrusive cables to carry live loads. The restoration plan will also give the city the capability to reintroduce a lightweight trolley system in the future.

Strengthening the main trusses is the most complex rehabilitation work being completed. By introducing 0.6" diameter wire strands in pairs, a process called post-tensioning, the structural system of the bridge is being improved. The strands provide alternate load paths within the trusses and free certain structural members to receive live loads (pedestrians and trolleys) instead of dead loads. The strands will be installed in pairs and attached to specially designed saddles near the lower joint pins.

The rehabilitation, which began in 1990 and is expected to be completed by May 1992, will renew the prominence of the Walnut Street Bridge in Chattanooga.

Colorado Street Bridge (1913)
Pasadena, CA

The City of Pasadena built the Colorado Street Bridge, which spans the Arroyo Seco, in 1913. Engineer J.A.L. Waddell designed the 1467' long open-spandrel, arched reinforced concrete structure, and John D. Mercereau, a well-known California contractor, constructed the bridge. At the time of its completion, the bridge was the highest concrete bridge in the world, and linked the growing areas of Los Angeles and Pasadena. Today, the bridge is listed in the National Register, as a Pasadena Cultural Heritage Landmark, and as a Historic Civil Engineering Landmark by the state chapter of the American Society of Civil Engineers.

The Colorado Street Bridge languished with little maintenance after a new bridge was constructed adjacent to it in the 1950s. In the early 1980s, engineers completed several studies to evaluate the bridge's condition, and began work to rehabilitate the structure in

1991. Cracked, spalled, and delaminated concrete was the most obvious sign of the deteriorated condition of the Colorado Street Bridge. Water penetration exacerbated the spalling condition where reinforcing bars were corroded—especially on the arches and piers. On the underdeck, stringer floor beams were deteriorated, shear cracks were visible, and the expansion joints were no longer operable.

Engineers inspected the bridge from a "snooper vehicle," from a crane, and with binoculars. A sound recording device detected subsurface deterioration of the deck, and engineers also determined that some areas had electrical potentials above .35 volts, indicating active corrosion of the deck reinforcement. Analysis of concrete cores revealed that the chloride content was below levels requiring replacement, but that high carbonation levels, which make the reinforcing steel susceptible to corrosion, necessitated making selective concrete replacement.

Wiss, Janney, Elstner and Associates served as preservation consultants to De Leuw, Cather Company, who prepared plans to rehabilitate the bridge after completing the structural and material analyses. The contractor will remove spalled and delaminated concrete on the members above the arches. In these areas, reinforcing bars will be coated with epoxy and secured with anchors. By controlling the new concrete mix and form work, workmen will match the appearance of the original construction. Finally, contractors will treat the concrete with water repellent to complete the design scheme's primary plan to keep water from reaching any of the reinforcing bars.

It was necessary to rehabilitate the Colorado Street Bridge to repair extensive deterioration, and to meet high standards for capacity and seismic loading. Funds from several Federal and state sources, totaling $21.8 million, have enabled this rehabilitation to proceed. Since the state did not intend to build a new bridge, but considered demolition, this rehabilitation demonstrates the resolve of the City of Pasadena to pursue this large-scale bridge preservation project with complex deterioration and design issues.

Bollman Bridge (1869)
Savage, MD

The two-span railroad bridge in Savage, MD, was designed in 1869 by Wendel Bollman, a self-educated engineer and entrepreneur. Bollman worked for the Baltimore and Ohio Railroad until 1858, when he started his own bridge building company. Bollman Bridge, one of many Bollman designed and built for the B&O, was the first bridge constructed principally of iron to be used by an American railroad.

The Baltimore and Ohio Railroad transferred the bridge to the Howard County Commissioners for preservation as a historic monument in 1966, the same year it was designated as the first National Historic Engineering Landmark by the American Society of Civil Engineers. As the only surviving bridge of its type, its significance spurred students at the University of Maryland to document it in 1966, and it was listed in the National Register of Historic Places in 1972.

Lack of funding prevented the county from restoring the bridge until 1979, when the Howard County Recreation and Parks Department solicited proposals to investigate the structural integrity of the bridge and to explore preservation alternatives. The Mechanicsburg, PA, engineering firm Modjeski and Masters developed a three-phase preservation program incorporating inspection and feasibility, preparation of contract documents, and supervision during the restoration. The consultants determined that even if the bridge were only to be used by pedestrians, the floor beam web plates would have to be replaced.

The Baltimore engineering firm Duffy-Montgomery completed the final contract documents in May 1982. After generating community support over a period of many years, the county commissioners approved a budget of $214,000 and voted to issue bonds to finance the restoration project. The bridge restoration, which began in September 1982, included the careful, sympathetic replacement of the deteriorated floor beam web plates. The contractor installed new plates of weathering steel, and attached them with button-headed bolts to simulate the appearance of the original rivets. The restoration also included the following elements: straightening and tightening of structural members, recasting and replacing missing parts, removal of a later stabilization truss, cleaning and repointing of the masonry piers and abutments, and stabilizing the river beds. The contractor, Dewey Jordan, Inc., completed the work in June 1983.

Missing decorative wooden boxes, designed to protect the connections of each corner in the upper chords, were replicated using historic photographs and one surviving box. High maintenance costs prevented the project team from repainting the bridge in its original polychromatic scheme. Given the lack of maintenance in the past, this decision is understandable. This project illustrates the successful use of substitute materials in combination with accurate replication of missing elements.

Second Street Bridge (1886)
Allegan, MI

In 1886, the City of Allegan accepted the $7,532 bid of the King Iron Bridge Company of Cleveland, OH, to erect a wrought-iron bridge over the Kalamazoo River. Improvements in iron making contributed to a revolution in bridge design between 1850 and 1890, and like many companies of the period, the King Iron Bridge Company focused on building iron bridges from patented designs. The Second Street Bridge is a double intersection Pratt through truss, also known as Whipple-Murphy truss. As an important example of the King Iron Bridge Company's work surviving today, it was listed in the National Register in 1980 and later recognized as a National Historical Engineering Landmark by the American Society of Civil Engineers.

The city commissioned an engineering study of the bridge in 1979, and the consultants concluded that the bridge could be preserved by replacing the deteriorated bridge deck. This study also recommended changing the bridge for use by one-way traffic. In 1979, a structural analysis using ultrasound determined that most of the iron structural members were in good condition and showed no signs of fatigue cracking, but some repairs were needed. Local support from citizens, press, and the City Historical Commission encouraged city officials to seek state highway department funding for the bridge's restoration. After more than a year and a half of negotiation, the state agreed to provide the city with Federal funds to restore the bridge, in part because the bridge was not along a critical transportation corridor. This project was one of the earliest federally funded bridge rehabilitations to be exempted from standards set by the American Association of State Highway and Transportation Officials (ASHTO) because of historical considerations. The rehabilitation cost $500,000 (one third of the estimated $1.5 million replacement cost for a new two-lane bridge). Wilkins and Wheaton Engineering Company developed restoration plans and specifications, which included replacement of selected structural members and the bridge deck, and installation of bolts with false heads to match the appearance of the original rivets. The contractor, H and K Construction, proposed building a rail system with rollers to move the bridge to a safer, more efficient location on the riverbank for disassembly, repair, and reassembly.

Pilings adjacent to the bridge and temporary concrete walls enabled the contractor to build a support structure for the beam and roller assembly. To prevent racking, the contractor welded temporary bracing to the bridge; a hydraulic crane winch then pulled the bridge ashore.

Once the bridge was removed from the roller assembly, workers erected scaffolding to facilitate truss disassembly. The contractor sandblasted the disassembled eyebars, and tested the iron members with ultrasonics and dye penetrants to ensure their integrity. Grand Rapids Steel fabricated new girders, stringers, and vertical compression members, and Hauer Bush fabricated new eyebars to replace unsalvageable members. All of the new parts matched the appearance of members which were not salvageable.

Convincing the state that restoration was a sound plan was a major hurdle in this project. The bridge now serves as both a "relief valve" in a successfully modified traffic pattern and as a historical anchor in the community. The project was recognized in 1988 when it received a National Historic Preservation Award.

Smithfield Street Bridge (1883)
Pittsburgh, PA

Over the next two years, the Smithfield Street Bridge, the oldest extant operating steel truss bridge in the United States, will undergo a $16 million restoration. Pittsburgh is synonymous with steel, and when the Smithfield Street Bridge was completed in 1883, its monumental lenticular trusses and decorative portals symbolized and amplified both the accomplishments of the city's main industry and the future of bridge building.

Engineer Gustav Lindenthal, the bridge's designer, was one of the most prominent engineers of the late 19th and early 20th century. At the time of its construction in 1883, the Smithfield Street Bridge was the longest lenticular truss in the country, and remains so today. It is a National Historic Landmark and a National Historic Civil Engineering Landmark.

A new truss added in 1890-91 expanded the width of the bridge and allowed the separation of vehicular traffic and street car lines. The bridge's deck and portals have also been changed on several occasions.

Funds to restore and rehabilitate the bridge are being provided largely from the Federal government. Local groups and citizens strongly support the restoration of this bridge, which is not "functionally obsolete," but structurally insufficient to carry current traffic loads.

The bridge preservation project will require substantial rehabilitation work. The most substantial work will be the installation of a new concrete and steel bridge deck. The railings and decks will be replaced, and the portals will be repaired. Structural repairs will include removing welds on tension members and retrofitting four eyebars to eliminate sources of fatigue cracking, retrofitting the truss bearings to meet current seismic criteria, and retrofitting the trusses to dampen vibration. On the approach spans, the concrete decks will be replaced, and the girders will be repaired. Restoration work will also be completed on the stone and mortar of the masonry piers and abutments.

This extensive preservation project is being planned and designed by Mackin Engineering Company of Pittsburgh, PA. This large-scale project combines the use of new material, when necessary, with sensitive repair work, to extend the life span of this significant highway bridge. A new lighting scheme is planned to dramatically illuminate the bridge so its will serve as a city landmark and gateway, even at night.

Riverside Avenue Bridge (1871)
Greenwich, CT

Owned by the state of Connecticut, the Riverside Avenue Bridge is one of only a few remaining cast-iron bridges in use today. It was listed in the National Register of Historic Places in 1977. The structure was originally part of a six-span railway bridge erected in 1871 over the Housatonic River in Stratford, CT. The Keystone Bridge Company of Pittsburgh, PA, constructed the bridge following the design of engineer F.C. Lowthorp. When the New York and New Haven Railway replaced the bridge in 1884, one of the bridge's spans was moved to Greenwich, and re-erected in 1895 as a roadway bridge at Riverside Station.

Built of composite cast-iron and wrought-iron elements with decorative brackets, this double- intersection Pratt truss bridge was considered both elegant and durable at the time of its construction. However, increasingly heavy locomotives led railway companies to remove cast-iron bridges from service when technological innovations with wrought-iron were made in the late 19th century. Indeed, this bridge is a rare surviving example from the cast-iron period of bridge building.

In 1986, traffic officials and local residents began to question the bridge's safety because of vibrations and isolated corrosion in the trusses. Without the original design documents, engineers from Frederic R. Harris, Inc., relied on ultrasonics, a non-destructive testing method, to determine the structural capacity of the bridge. Testing revealed that rehabilitation work was necessary to strengthen the bridge. After considering several alternatives, including replacing deteriorated elements of the truss and converting the bridge for pedestrian use, engineers proposed building a new bridge inside the historic bridge. This proposal recommended replacing the existing wooden deck with a new, pre-assembled concrete structure designed to carry all vehicular loads. By cutting notches in the steel cross beams on the bottom of the truss, it was possible to create a new deck of the proper thickness without significantly altering the appearance of the original truss design. The Connecticut Department of Transportation accepted the proposal, and work to rehabilitate the bridge began in August 1988. Contractors carefully rolled the new girder system into place using one crane to pull the bridge and one to steer the bridge. In addition, the entire superstructure was cleaned and painted.

Today, the Riverside Avenue Bridge remains in service, the original structure supporting only its own weight. At a cost of $2.7 million, the state successfully rehabilitated an important engineering landmark by inserting a second structure within the bridge. This innovative engineering solution protected the integrity of the original truss system.

Schoharie Creek Aqueduct (1841)
Fort Hunter, NY

Built in 1841, the Schoharie Creek Aqueduct was originally comprised of arches which supported an earth filled tow path and a timber canal channel. This system enabled a driver and his mule team to pull a barge through the channel. The aqueduct served as part of the Erie Canal system, and the remaining ruins are located in Fort Hunter, NY. The American Society of Civil Engineers designated the aqueduct ruin a National Historic Engineering Landmark in 1967.

Five of the original fourteen arches had been demolished before 1940 to prevent ice jamming in the channel. Flooding caused another arch to collapse in 1977, at which time the New York State Office of Parks and Recreation, the landmark owner, decided to stabilize the structure. This agency hired Ryan-Biggs Engineering to develop stabilization alternatives. The first alternative was to construct a buttress at the end of the last pier. This solution would have marred the appearance of the structure and also would have required stabilizing each pier to prevent foundation movement between the buttress and piers. A second alternative was considered by Ryan-Biggs Engineering, and later executed. Engineers conceived an innovative tie-back design using tendons and springs. This design would provide an artificial force at the keystone of the next to last arch to counteract the missing support.

Construction began in December 1977, and the completed project cost $170,000. Temporary regrading in the creek bed enabled the contractor, Barry and Bette, to create a foundation for shoring on the last two arches. Much of the tow path area in the last arch was replaced with lightweight concrete to facilitate proper anchorage of the stonework, and to allow engineers to accurately calculate the cumulative force (200,000 pounds) for the spring settings in the tendon bundles.

Two bundles of five tendons, encased in concrete, were installed in the tow path fill, extending 362' from the abutment to the keystone of the unstable arch. Thirty springs located in a concrete anchorage box near the abutment allow the flexible tendons to move with the shifting foundation. The anchorage box contains a fixed concrete wall and a reinforced concrete compensation block which slides on four Teflon bearing plates. At each pier, where the tendon bundles change elevations, concrete deflection blocks were installed to control the direction of the forces along the length of the tendon path.

By relying on steel springs to compensate for the different coefficients of expansion of the tendons and existing masonry structure, the tie-back solution stabilized the remaining arches of the Schoharie Creek Aqueduct. Few projects have incorporated such innovative engineering solutions to sensitively preserve a historic structure. Even though the aqueduct does not carry vehicular traffic, the use of modern materials was necessary to stabilize this engineering ruin.

Cornish/Windsor Covered Bridge (1866)
Windsor, VT and Cornish City, NH

The Cornish-Windsor Covered Bridge spans the ~l Connecticut River, and is owned and maintained by the state of New Hampshire and the Town of Windsor, Vermont. Built in 1866 by James Tasker and Bela Fletcher, the two-span, 460' long bridge is the longest covered bridge in the United States. Listed in the National Register of Historic Places and as an American Society of Civil Engineers (ASCE) National Historic Civil Engineering Landmark, this bridge is one of the only surviving bridges built from the design patented by Ithiel Town in 1839. The "Town Lattice" is distinguished by its use of "simple sizes of lumber, the small amount of framing required and the need of nothing but bolts and a few round rods for metal work," according to Robert Fletcher and J.P. Snow, authors of a 1976 ASCE paper.

Inspections by engineers revealed that the overstressed structural system was incapable of carrying current traffic loads. In planning to upgrade and reinforce the bridge, transportation officials and the public debated engineering and preservation alternatives. Such debates were not new. As early as 1908, engineers proposed using arches to reinforce the bridge, and in fact, the Committee for the Authentic Restoration of the Cornish-Windsor Bridge supported this method in 1984. The Committee's plan recommended retrofitting the bridge with four radial arches, built of laminated Douglas Fir members and secured with stitch bolts and spikes. Transportation and preservation officials objected to this plan, however, for a number of reasons. The proposed arches would have altered the original design, and would have required raising the bridge four feet to keep the arches free from winter ice which forms in the Connecticut River. Finally, from an engineering perspective, the spring points of the new arches would have been unprotected and subject to excessive moisture and ice damage.

In 1988, members of a committee composed of preservation and highway officials decided against the arch solution in favor of replacing overstressed structural members with new ones of prefabricated glue-laminated timber. Replacement in-kind was not feasible because solid timbers of the size required are not commercially available, and because high stress areas would occur where timber members would be spliced.

First introduced in the United States from Germany in 1936, glue-laminated timber raises design values (structural capacity) by employing clear, dense laminations in areas of high stress. Bonded with waterproof glue, the glue laminated timber is advantageous because it can be bonded in long lengths, it ensures quality control, it can be thoroughly treated with a preservative, and it dries to less than 15% moisture content.

In 1988, DCF Engineering designed the glue laminated timber solution, and during 1988 and 1989 work was completed while a temporary cable-stayed system supported the bridge. The entire project cost the state of New Hampshire $4.3 million. Although the overall bridge stiffness is not as great as would have been achieved with laminated arches, and some of the bridge's historic fabric was replaced, the solution retained the original structural truss system, without raising the bridge or changing its appearance. This solution achieved the structural capacity required to carry truck traffic by employing modern materials and an ingenious engineering solution to preserve an important engineering landmark.

West Fifth Street Bridge (1925)
Ashtabula, OH

Erected in 1925 by Kelly-Atkinson Construction Company, the West Fifth Street Bridge is a single leaf bascule (moveable) bridge. This bridge, which is eligible for listing in the National Register of Historic Places, is the only remaining Ohio example of the Mystic type of Brown bascule, named for the inventor, Thomas E. Brown, who built a similar bridge in Mystic, Connecticut. The patented design relies on overhead counterweights connected to a truss system of balance beams.

After local residents learned the state was considering demolition of the deteriorated bridge, support for its preservation grew. Between 1980 and 1982, Richland Engineering, of Mansfield, OH, conducted an inspection survey and structural analysis of the bridge, and produced feasibility studies of design alternatives. Working together, public officials, engineers from the state, and local residents concluded that rehabilitating the existing bridge was preferable to constructing a new bridge. A new bridge would cost two times as much as rehabilitating the existing structure, and would require demolishing historic buildings near the approaches. Although transportation officials had reservations about not meeting width and weight requirements, a compromise was reached. The required width for two lane traffic would not be achieved, but the bridge would still be wide enough, technically, to carry two lanes. Modifications to the inadequate structural system enabled engineers to meet requirements for weight capacity. Eighty percent of the $3 million dollar rehabilitation cost was federally funded, and the state, county, and City of Ashtabula provided the balance.

The bridge underwent rehabilitation between September 1985 and December 1986, during which time the bridge was closed to vehicular traffic. Richland Engineering was retained to develop contract documents for the bridge rehabilitation. In order to complete much of the rehabilitation work, the contractor removed the moving span truss to another location on; barge. By working on the barge, work on the bridge did not interrupt navigation on the Ashtabula River.

The substantial rehabilitation of the 160' span included the following work: replacing truss span stringers and floorbeams, replacing deteriorated lower chord connect ions, repairing concrete and steel railing, constructing new fenders, an abutment, and operator's house, and overhauling the lift machinery, lighting system, and electrical system. Because the new concrete filled, steel grid deck weighed more than the original, it was necessary to rebalance the structure by increasing the weight of the counterweight.

Waddell “A” Truss Bridge (1898)

The Quincy, Omaha and Kansas City Railway constructed a single-track bridge near Trimble, MO, in 1898 from the patented "A" Truss design of J.A.L. Waddell, an engineer trained at Rensselaer Polytechnic Institute. Waddell conceived the "A" Truss as an economical short-span, pin-connected structure capable of carrying heavy loads. During his lifetime, Waddell taught engineering in several countries, designed bridges around the world, published prolifically, and patented many bridge designs. At the time of the "A" Truss Bridge's construction, Waddell had already become one of the United States' best known engineers.

When the Waddell "A" Truss Bridge was moved in 1989, its use had changed for the second time. After its abandonment in 1939, the state used the bridge as part of the state highway system. And in 1980, the Army Corps of Engineers marked, dismantled, and stored the bridge to make way for a future lake.

The Army Corps turned down several proposals before agreeing to let the City of Parkville, MO, acquire the bridge for use as a pedestrian crossing and as part of an exercise trail. Under the direction of civil engineering professor George Hauck from the University of Missouri at Kansas City, students planned the bridge's reassembly, and designed abutments for its new location in English Landing Park. Hauck's students and several other engineers received donations from local companies in the form of time, equipment, and materials, enabling the city to reassemble the bridge at a cost of only $1,500.

The students' design deviated from the original in only two areas, and preserved the majority of the bridge's historic fabric. First, rivets that had been removed when the bridge was disassembled were replaced with highstrength bolts. Second, new abutments were designed to replace the original cylindrical iron-clad piers left behind when the Army Corps dismantled the bridge. Wooden planking now covers the bridge deck in place of pavement and steel railroad tracks, giving life, yet again, to one of only two remaining Waddell "A" Truss bridges nationwide.

Preliminary Checklist of Historic Bridge Rehabilitation and Relocation Projects

San Rafael Bridge (1922)
Pasadena, California

Devil's Gate Trestle
Georgetown, Colorado

Key Bridge
Washington, District of Columbia

Blackwell Bridge (1917)
Elbert County, Georgia

Hanalei River Bridge (1912)
Kauai, Hawaii

Guffey Bridge (1897)
Snake River Birds of Prey Area, Idaho

Sutliff Bridge
Johnson County, Iowa

Freeport Bridge
Decorah, Iowa

Freemont Mill Bridge
Center Junction vicinity, Iowa

Hardin City Bridge
Eldora vicinity, Iowa

Little Pipe Creek Bridge (c. 1875)
Detour, Maryland

Sparks Road Bridges [8] (1884-1919)
Baltimore County, Maryland

Wilson's Bridge
Hagerstown, Maryland

Frederick County Bridges [5]
Frederick County, Maryland

Buckland/Shelburne Fall Bridge (1890)
Buckland/Shelburne, Massachusetts

French-King Bridge (1932)
Erving/Montague, Massachusetts

Choate Bridge (org. 1764)
Ipswich, Massachusetts

Gilbertville Bridge (1886)
Ware/Hardwick, Massachusetts

Old Covered Bridge (1835)
Sheffield, Massachusetts

Old Curtisville Stone Bridge (1842)
Stockbridge, Massachusetts

6th Street Bridge (1886)
Grand Rapids, Michigan

Dehmel Road Bridge (1907)
Frankenmuth, Michigan

Windsor Harbor Road Bridge
Kimmswick, Missouri

1889 Pony Truss (1889)
Langdon, New Hampshire

Broad Street Bridge
Rochester, New York

Rexleigh Covered Bridge
Rexleigh, New York

Carroll Street Retractile Bridge
New York, New York

Pawling Avenue Bridge
Troy, New York

6th Street Bridge (1910)
Wilmington, North Carolina

Baldwin Bowstring Arch Bridge (1871)
Cincinnati, Ohio

3-span Pratt Through Truss Bridge (1897)
Shelbume, New Hampshire

Bedell Covered Bridge
Haverhill, New Hampshire

Canajoharie Creek Bridge (c. 1875)
Canajoharie, New York

Tioronda Bridge (c. 1870)
Beacon, New York

Queensboro Bridge (1909)
New York, New York

Brooklyn Bridge
New York, New York

Manhattan Bridge
New York, New York

Cast-Iron Bridges of Central Park [5]
New York, New York

Prospect Park Bridges
Brooklyn, New York

Centerway Bridge (1921)
Corning, New York

Broad Street Bridge
Rochester, New York

Rexleigh Covered Bridge
Rexleigh, New York

Pawling Avenue Bridge
Troy, New York

6th Street Bridge (1910)
Wilmington, North Carolina

Baldwin Bowstring Arch Bridge (1871)
Cincinnati, Ohio

Rodrick Bridge (1872)
Linton, Ohio

Twin Creek Inverted Bowstring (1865)
Germantown, Ohio

Jordan Bridge
Stayton, Oregon

Antelope Creek Covered Bridge
Eagle Point, Oregon

Waterville Bridge
Swatara Gap, Pennsylvania

Delaware Aqueduct (1849)
Lackawaxen, Pennsylvania

Walnut Street Bridge (c. 1889)
Harrisburg, Pennsylvania

Hensecker Covered Bridge (1848)
Lancaster, Pennsylvania

Massengill Bridge
Morris, Tennessee

Congress Avenue Bridge (1909)
Austin, Texas

Elm Street Bridge (1870)
Woodstock, Vermont

Granite Street Bridge (1902)
Montpelier, Vermont

Quinlan Covered Bridge
Charlotte, Vermont

Roaring Run Bridge (1878)
Bedford, Virginia

Meems Bottom Covered Bridge (c. 1893)
Mt. Jackson, Virginia

Lyons Ferry/Snake River Bridge (1927)
Vantage, Washington

Staats Mill Bridge
Ripley, West Virginia

Wheeling Suspension Bridge
Wheeling, West Virginia

The Historic American Engineering Record (HAER) actively compiles information about historic bridge rehabilitation and relocation projects. Anyone with information about projects is encouraged to write HAER at the following address:

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Record
National Park Service
P.O. Box 37127
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